REMARKS

As of the Office action dated November 13, 2006, claims 1-15 and 17-20 are pending, with claims 1, 2, 4, 5, 7, 9-12, 14, 15, 17 and 19 having been rejected, and claims 3, 6, 8, 13, 18, and 20 having been objected to. Claim 16 was previously canceled. Applicants filed an Amendment After Final, which was denied entry in an Advisory Action dated August 15, 2007. Accordingly, applicants now file this Amendment along with a Request for Continued Examination. In this Amendment, some claims have been amended, claims 14, 15, 17 and 19 have been canceled to remove them from consideration, and claims 18 and 20 have been rewritten to overcome the objection thereto and place them in condition for allowance. Applicants believe that the remaining claims are patentable over the new references applied by the examiner, for reasons explained below. In view of the amendment and remarks, the examiner is requested to pass the application to allowance.

Request for Non-Entry of an Unentered Amendment

Applicants respectfully request that the Amendment After Final Action Under 37 CFR 1.116 filed July 30, 2007, NOT be entered. Entry of the Amendment After Final Action was denied in the Advisory Action dated August 15, 2007.

Examiner Interview

An interview was held on September 11, 2007, between Examiner van Roy, the undersigned who is attorney of record, and David M. Giorgi who is one of the inventors. The participants discussed how the new limitations of "capacitive" energy storage element and "operatively charged" in independent claims 1 and 13 distinguish over the new references applied in the final Office action. While Examiner van Roy was receptive to the new language, no agreement was reached on patentability. Applicants' comments are reiterated below, with elaboration, for the examiner's further consideration.

Explanation of the Amendment

The examiner stated that the prior amendment to claim 1 regarding the use of the term "chargeable" effectively broadens the claim with respect to an applied voltage magnitude. The examiner interprets the change as requiring only that the capacitors have the physical ability to be charged to the stated magnitude.

The examiner's construction of the phrase in question was not applicants intention, as was clear from applicants' remark in the prior response on page 10 that "[t]his amendment makes clear that the first and second voltage magnitudes refer to the voltage on the respective capacitors before discharge."

Accordingly, claims 1 and 13 have been amended in a further attempt to capture applicants' intention while complying with the examiner's desire for clarity. Specifically, the claims now provide that the capacitive energy storage elements are <u>operatively charged</u> to their respective voltage magnitudes, and the laser diode is controllably coupled to the capacitive energy storage elements for <u>operatively receiving a discharge</u> of energy therefrom.

Claims 1 and 13 have also been amended by changing "energy storage element" to –capacitive energy storage element– to make clear that the laser diode operatively receives a discharge of energy from capacitive energy storage elements.

Claim 13 has been further amended by relocating the phrase "through the switch-controlled circuit" to bring maintain consistency in language between claims 1 and 13. The scope has not been altered by this change.

Claims 10 and 11 have been amended to make clear that the capacitive energy storage element is understood to comprise a <u>capacitor</u>, whether alone, contained in a pulse forming network, coupled to a battery, coupled to a fuel cell, an array of one or more of the foregoing, or any combination of the foregoing. Support for the amendment may be found in Paragraph [0041] of the published application.

Other claims have been changed to maintain proper antecedent basis with the term "capacitive energy storage element."

Claim 7 has been amended to correct a plain error in dependency. Claim 7 now depends from claim 5, which contains antecedent basis for the first and second switches. Claim 2 did not contain proper antecedent basis.

Claims 18 and 20 have been rewritten in independent form to place them in condition for allowance, as suggested by the examiner.

New claims 21-23 have been added to limit the switch-controlled circuit path to one or more closing switches. Support for claims 21 and 22 may be found in Paragraph [0037] and Figures 2, 7 and 13 of the published application. Support for claims 21 and 23 may be found in Paragraph [0037] and Figures 5, 6, 8 and 9 of the published application.

Claims 1, 2, 4, 5, 7 and 9-12 are Patentable Over Hannan et al.

Claims 1, 2, 4, 5, 7 and 9-12 have been rejected under 35 USC § 102(b) as being anticipated by a new reference, US Patent No. 3,371,232 issued to Hannan et al. The rejection is traversed.

With reference to Figure 2 of Hannan, the examiner compares the claimed first capacitive energy storage element in the slow voltage discharge stage to capacitor 34, and the second capacitive energy storage element in the fast voltage discharge stage to capacitor 40. The examiner states that the voltage across capacitor 40 (which is compared to the second voltage magnitude) can be greater than the voltage across capacitor 34 (which is compared to the first voltage magnitude). This is not true.

What happens in the circuit of Hannan is the following. Capacitor 34 is charged to the supply voltage 49. When switch 45 closes, current flows from capacitor 34 through diode 62, switch 45, laser diode 30, diode 37, capacitor 40 and then back to

capacitor 34. Using Kirchhoff's Voltage Law which states that the sum of the voltages around the loop has to be equal to zero, we have:

$$V34=V62+V45+V30+V37+V40$$

Even if we ignore voltage drops across the diodes and switch during condition, the largest voltage that capacitor 40 can be charged to is the voltage on capacitor 34, or:

$$V34=V40$$

Hannan even states this condition when explaining the circuit operation in referring to simplified Figure 1. He states in column 2, lines 12-16 that "[w]hen switch 25 is closed and switch 26 is open, current flow through the laser diode 15 and diode 21 charging the capacitor 23 in one direction to a positive voltage <u>equal to the supply voltage</u> 12 or half the voltage across the series connection voltage sources 12, 13 (+E/2)" (emphasis supplied). The supply voltage 12 is analogous to the supply voltage 49 in Figure 2, which charges capacitor 34. Hannan therefore teaches that the voltage across capacitor 23 (in Figure 1) or capacitor 40 (in Figure 2) cannot be greater than the voltage across the voltage source 12 (in Figure 1) or the voltage across the capacitor 34 (in Figure 2). Thus Hannan teaches exactly the opposite of what the examiner states, and exactly the opposite of what is claimed in claim 1.

During the interview, Examiner van Roy asked whether there were any circumstances under which capacitor 40 in the circuit of Hannan would charge to a higher voltage than capacitor 34. Responding to the examiner's question, Mr. Giorgi did not think that capacitor 40 in the circuit of Hannan would charge to a higher voltage than capacitor 34. However, Mr. Giorgi speculated that placing an inductor component of a suitable value into the circuit might cause a momentary voltage to exist across capacitor 40 that would be in excess of the voltage across capacitor 34. However, applicants stress that Hannan does not teach or suggest such a modification, and that such a modification would not serve a constructive purpose in the Hannan circuit. Mr. Giorgi's

statement is a speculative statement on a hypothetical situation, and is not to be taken as an admission.

A further distinction is that the circuit containing capacitor 40 is not a fast voltage discharge stage because it is incapable of function as such. The claimed fast voltage discharge stage determines the rise time of the pulse, not the pulse width (which is determined by the slow voltage discharge stage). However, Hannan teaches that in column 4, lines 17-18, that "[c]apacitor 40 determines the time constant of the pulse energy so applied or pulse duration." Hence, the circuit containing capacitor 40 cannot be considered to be a fast voltage discharge stage.

The Teachings of Takahashi et al. are Irrelevant to Claims 1, 2, 4 and 9-12

Claims 1, 2, 4 and 9-12 have been rejected under 35 USC § 102(b) as being anticipated by a new reference, US Patent No. 4,928,248 issued to Takahashi et al. The rejection is traversed.

Takahashi does not teach coupling a laser diode through a switch-controlled circuit path to first and second capacitive energy storage elements. In fact, Takahashi is based on using an opening switch (step recovery diode) to drive a pulse into the laser diode. In an opening switch-based circuit, the energy is stored in an inductor and is released by the inductor into the laser diode by the switch. As shown in Figure 2, the current risetime is dependent on the speed of the opening switch and the pulse width is dependent on the L/R time constant of the circuit. To reiterate, these types of circuits in which the switch releases energy from an inductor <u>are fundamentally different from</u> the claimed circuit in which the switch releases energy from capacitors.

The closing switch limitations of claims 21-23 further distinguish those claims from Takahashi, which is based on using an opening switch (step recovery diode) to drive a pulse into the laser diode.

It will be appreciated that an opening switch based circuit may include a capacitive energy storage element, and may use that capacitive energy storage element to help energize the inductor. Energy ***from the inductor*** may then be transferred to the laser diode. However, a capacitor used to energize an inductor should not be confused with the claimed capacitive energy storage elements. As claimed, the laser diode is controllably coupled through the switch-controlled circuit path ***to the capacitive energy storage elements for receiving a discharge of energy therefrom*** (emphasis supplied). Following is a detailed explanation of why the capacitors disclosed in Takahashi do not discharge energy into the laser diode.

The examiner compares the first capacitive energy storage element to capacitor 10 (Figure 1 of Takahashi). However, it is easy to see that the energy stored in this element is not transferred to the laser diode. By looking at Figure 1 one can see that the forward current (labeled If) flows mainly through the resistor 9, and the voltage developed across the capacitor 10 is just the voltage drop across the resistor, which can in fact be arbitrarily small since the resistor 9 is variable. Moreover, when the current reverses through the diode element 8, the reverse current (which mainly flows through capacitor 10, although the current flow path Ir through capacitor 10 is not shown in Figure 1) flows only through the inductor 7 (current labeled Ir in Figure 1), not the laser diode 4. Thus any energy associated with capacitor 10 is transferred to the inductor 7, and not to the laser diode 4. Also since the energy is transferred to the laser diode 4 during the opening of the diode 8 (refer to the timing in Figure 2) the capacitor 10 is decoupled from the circuit (it is in series with and open circuit) and thus cannot possibly transfer energy to the laser diode. The energy is transferred from the inductor 7 to the laser diode 4.

If the energy stored in capacitor 10 is not transferred to the laser diode, then what is capacitor 10 for? Capacitor 10 is only mentioned once in Takahashi, as its function is not germane to the operation of the circuit. Capacitor 10 acts simply as a bypass capacitor across resistor 9. If this capacitor were removed, the circuit would still

operate in a very similar fashion. Therefore, capacitor 10 cannot be compared to the claimed first capacitive energy storage element.

The examiner also compares the second capacitive energy storage element to capacitor 13 in Figure 1. This again is not correct. Capacitor 13 is simply a DC blocking capacitor. Takahashi states in column 5, lines 17-21 that ". . . a DC component is removed from the output voltage Vj with the aid of the variable capacitor 13 and the resultant voltage is applied to the light source, namely, the semiconductor laser 4 and to the delay line 12." This DC blocking capacitor is used to remove the DC component as this component would be shorted by the addition of the delay line 12.

Conclusion

In view of the foregoing amendments, it is believed that the application is now in condition for allowance. Applicants respectfully request favorable reconsideration and the timely issuance of a Notice of Allowance.

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